
Space Weather Forecast

Issued on Friday, 19 May 2023 at 13:03 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: Minor/Moderate radio blackouts from Moderate-class X-ray flares likely.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate over the past 24 hours, with occasional Moderate class flares originating from a large sunspot region in the northeast quadrant. The largest flare was a M5.2 observed at 19/0048UTC.

There are currently nine sunspot regions on the visible disc, one of which is has recently emerged in the southeast quadrant and is currently unnumbered. The largest and most complex region is located in the northeast quadrant. A delta spot may become apparent in its central part as the region progressively rotates westwards away from the eastern limb, revealing more details. There is another significant region in the southeast quadrant, as well as another one in the northwest quadrant although this one has started to reduce in size. Of the remaining regions, including the new region that has recently emerged onto the southeast limb, most are small, weak and simple.

There have been various filament eruptions over the past 24 hours, and also prominence eruptions, these mainly from the NE limb or quadrant or far sided. A filament eruption that was seen leaving the sun on 17 May may give a slight glancing blow at Earth but confidence is low. Another filament eruption was seen leaving the sun early on 19 May, quickly followed by a Coronal Mass Ejection. It may be Earth-directed but there are currently not enough satellite imagery to analyse it.

Solar Wind / Geomagnetic Activity: The solar wind was suggestive of a slow solar wind regime. The solar wind speed was steady whilst the number of particles within the solar wind were low and below average. The total magnetic field strength was weak, while the north-south component was also weak and mostly coaligned with the Earth's magnetic field.

The net result of the above solar wind measures was for quiet geomagnetic activity throughout.

Energetic Particles / Solar Radiation: Solar radiation showed a continued slow decline in the wake of 16 May's large proton-producing Moderate class flare from behind the eastern solar horizon, having peaked at 0.8pfu - i.e. roughly ten times below S1 for this energy level.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is likely to remain Moderate with a slight chance of Strong-class X-ray flares throughout, arising mainly from the arriving combination of eastern solar horizon spots. No significant regions leave the Sun in the period, and no new large regions are expected to arrive, leading to a level risk throughout.

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Solar Wind / Geomagnetic Activity: A filament eruption seen on the 17th from the southwest quadrant resulted in a CME, which has now been analysed with a potential Earth directed component arriving on the 21st. However, this CME is likely to be weak and any impacts to be modest. The solar wind is expected to remain at slightly elevated levels through much of the period, before increasing to 500-600km/s at the end of day 4 at the onset of the HSS associated with CH05/-. An enhanced solar wind from a coronal hole feature is expected to arrive tomorrow at Earth, most likely in the evening, with speeds of 450-500 km/s expected. The effects of this enhancement are likely to wane through day 4 (22nd).

Geomagnetic activity is expected to be largely Quiet to Unsettled overall, with a slight chance of Active periods (Kp 4) on day 3 (21st) following the expected CME's arrival.

Energetic Particles / Solar Radiation: Solar radiation carries a daily Slight Chance of passing S1 levels, largely as a result of the eastern hemisphere spots, with this very gradually rising over the four days as they migrate westwards.

Geomagnetic Storms:

Geo-Magnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	1	1	20	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	Yes	70	70	70	70
Very Active	R3 to R5 X	No	15	15	15	15

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	10	10	15	15
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm⁻²sr⁻¹s⁻¹)